DOCUMENT RESUME

ED 479 433 IR 022 110

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TITLE	The Changing Role of Instructors in Distance Education: Impact on Tool Support.
SPONS AGENCY	Federal Ministry of Education, Science, Research, and Technology, Bonn (Germany).
PUB DATE	2002-10-00
NOTE	9p.; In: E-Learn 2002 World Conference on E-Learning in Corporate, Government, Healthcare, & Higher Education. Proceedings (7th, Montreal, Quebec, Canada, October 15-19, 2002); see IR 022 093.
AVAILABLE FROM	Association for the Advancement of Computing in Education (AACE), P.O. Box 3728, Norfolk, VA 23514. Tel: 757-623-7588; e-mail: info@aace.org; Web site: http://www.aace.org/DL/.
PUB TYPE	Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE	EDRS Price MF01 Plus Postage. PC Not Available from EDRS
DESCRIPTORS	Computer Assisted Instruction; *Distance Education; Educational Technology; Foreign Countries; Higher Education; *Instructional Design; Internet; Online Systems; *Teacher Role; World Wide Web
IDENTIFIERS	University of Hagen (Germany)

ABSTRACT

At the university of Hagen a lot of experience exists in performing Web-based teaching and in implementing tools supporting e-learning. To share this knowledge, (inexperienced) instructors more and more ask for tool-based assistance in designing and administrating e-learning courses. Considering experience from other universities, it becomes obvious that there is in general a lack of a broad system support of tasks to be fulfilled while performing e-learning. This paper proposes an adaptable course assistant that provides the required tool support. It helps in selecting and utilizing Internet and Web technology, respectively. The knowledge of how to run a virtual course is modeled by means of course templates, which may be adopted to special needs. Before introducing the assistant, the changing role of instructors in distance education is discussed, as well as the impact on the requirements of tool support with respect to designing and administrating a course. (Contains 13 references.) (Author)

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The Changing Role of Instructors in Distance Education: Impact on Tool Support

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Abstract: At the university of Hagen a lot of experience exists in performing web-based teaching and in implementing tools supporting e-learning. To share this knowledge, (inexperienced) instructors more and more ask for tool-based assistance in designing and administrating e-learning courses. Considering experience from other universities it becomes obvious, that there is in general a lack of a broad system support of tasks to be fulfilled while performing e-learning. Within this paper we propose an adaptable course assistant which provides the required tool support. It helps in selecting and utilizing Internet and web technology, respectively. The knowledge of how to run a virtual course is modeled by means of course templates, which may be adopted to special needs. Before introducing the assistant we will discuss the changing role of instructors in distance education and its impact on the requirements of tool support with respect to designing and administrating a course.

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Introduction

At the university of distance education (FernUniversität) Hagen, Germany, a lot of experience exists in performing web-based teaching as well as in implementing tools supporting e-learning (e.g. Buhrmann et al. 1997). In the beginning the main objective of the projects started to introduce e-learning was to remove the severest restrictions of traditional distance teaching. The decision to perform web-based teaching and thus to use the tools and platforms developed was up to the instructors of the individual courses.

Caused by the fundamental decision to "bring the whole university on the net" (Hoyer 2001) the different systems were integrated into one single platform, the *Virtual University*[1],[2], to be used by all instructors for online teaching. Thus, in general, the role of instructors in distance education is changing imposing additional and new tasks on them. They have, for example, to develop web-pages, moderate newsgroups, or administrate cooperative learning environments. Besides such tasks resulting from using the Internet-based tools and services, instructors have to redesign their teaching courses and to find new ways of distance teaching. Altogether, the predominant question, not only of inexperienced instructors, is "How to utilize Internet technology to enhance web- based teaching and learning?" This implies aspects of didactics as well as of the technique to be used.

At the university of Hagen several workshops are organized periodically within which instructors share their knowledge ("teach the teacher"). However, organizing as well as participating in such events is often claimed to be too time consuming. Furthermore, it doesn't help if an instructor needs ad-hoc clues for designing his online course. Instructors of the university more and more ask for tool-based assistance in designing and administrating e-learning courses. Considering experience from other universities it becomes obvious, that there is in general a lack of a broad system support of tasks to be fulfilled while performing e-learning (e.g. Klobas & Renzi 2000, Tielmans & Collis 1999).

Within this paper we propose an *adaptable course assistant* which provides the required tool support. It helps in selecting and utilizing Internet and web technology, respectively. The knowledge of how to run a virtual course is modeled by means of course templates, which may be adopted to special needs. Before introducing the

[1] https://vu.fernuni-hagen.de

[2] This system is currently being improved and extended by the developer group of the University Computer Centre (URZ) as well as by research groups of different departments.

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assistant we will discuss the changing role of instructors in distance education and its impact on the requirements of tool support with respect to designing and administrating a course.

From traditional distance learning to web-based learning

Traditionally, the university of Hagen delivers its learning material (textbooks and workbooks) in print. The material for a course is partitioned into units to be sent to the students sequentially. Each unit is designed to be worked out within a time period of two weeks. Communication takes place by means of traditional media like telephone and physical mails.

In a few cases the students have to be physically present at the university. Typical examples are hands-on trainings performed in a lab located at the university or oral examinations. This conventional mode of distance teaching and learning is afflicted with different kinds of problems, most of which can be avoided by using Internet technology, and tools and services based on it. In 1996 the university of Hagen started several projects towards becoming a virtual university. Within these projects interactive and multimedia learning material as well as tools and platforms supporting e-learning were developed. The latter are now integrated into a coherent platform constituting the teaching and learning environment of the whole university. In the beginning the main objective was to remove the severest restrictions of traditional distance teaching:

In time feedback. From the students' view, as all learning material was delivered by physical mail, the time delay between sending their homework and receiving feedback (e.g. corrections and comments) were too large. Often students got remarks on their exercises several weeks later when they were already working on other topics of their material. From the didactical prospect this disadvantage was one factor of slowing down the learning process. Tools incorporating Internet technology, e.g. WebAssign (Brunsmann et al. 1999) which supports submitting and receiving electronic assignments, enable students to receive feedback in time.

Being up-to-date. Because of the typographical process instructors had to hand over the complete learning material of each course to the print office six months before it started. Using web-based delivery facilities enables ad hoc modifications, e.g. to introduce latest research results into the course material.

Enhanced communication. At the traditional university of Hagen the communication between instructors and students was usually reduced to information letters (regularly sent to the students to announce course information) and telephone calls. Using synchronous and asynchronous communication services of the Internet enables in time information and tutoring as well as building communities between students.

Virtual presence. Students participating in face-to-face seminars or hands-on experience had to be physically present at the labs of the university. These types of courses are often criticized as being too expensive and time consuming as students have to travel from far away. The web-based forms of these course types (*Virtual Seminar* and *Virtual Practical*) enable the students to meet in virtual rooms (Berkel & Mittrach 1997), to perform laboratory experiments by remote control or by means of simulation and visualization within a virtual environment (Bischoff & Röhrig 2001).

The Changing Role of Instructors

As shown in the above examples introducing web-based teaching enables instructors to enhance learning and teaching for the benefits of the students. On the other side, the role of instructors changes:

- from textbook author to author of interactive and multimedia learning material,
- from text provider to tutor interacting with students by means of the new communication facilities like e-mail, newsgroup, and chat,
- becoming a group member slipping into different roles within computer supported collaborative learning environments,
- being a user of the new media utilizing Internet techniques and tools,
- becoming a course designer defining different e-course types, e.g. Virtual Seminars or Virtual Practical,
- becoming a course administrator, e.g. administrating the course web-site.

Years of experience show that the acceptance to adopt the new role varies between instructors. It becomes obvious that it is highly influenced by the fact whether the decision to perform web-based teaching is driven *externally* or *internally*.

The dominant external factor is given by the decision of the institution to bring the whole university on the net, i.e. to launch a virtual university (Hoyer 2001, Krämer 2000). In addition, and this holds true for distance universities in general as well as for traditional universities, instructors have to be online. They are expected to provide an Internet presentation showing, e.g., their research topics and teaching activities. Furthermore, students more and more ask for web-based learning materials.

If external aspects constitute the main factor for introducing web-based teaching acceptance is generally low. In particular, the following aspects were identified as problems:

- How to use Internet technology and services as well as tools based on it? (aspects of the technology to be used)
- How to perform web-based teaching? (aspects of didactics)
- Will the Virtual University prescribe how to teach? (independence of teaching)

Although web-based learning and teaching is in its infancy and still evolving, distance education can benefit from it in many respects. Hence, most of the instructors are motivated to investigate ways of e-learning within their field of research and applying it in practice. In this case changing the role of instructors is driven internally, i.e. motivated by themselves searching for answers to the questions mentioned above.

The division in externally given decisions and internally driven motivation is not as strict as it may sound above. It shows only two extremes somewhere between which the instructors are located. In addition to these factors the acceptance of the new role is influenced by the knowledge and experience in computer and Internet technology of the individual instructor. In other words, it depends on existing tools enabling e-learning. In the following we will focus on tool support with respects to course design and administration, as other aspects are often discussed elsewhere.

The Role of Course Designer and Course Administrator

How can the Internet be utilized to enhance web-based teaching and learning? There are a lot of decisions to be made with respect to the structure of virtual courses, their organization (e.g. announcements of examination, providing course web pages) and the use of existing tools and Internet services (e.g. the possibility to use an Interned-based exercise system or chats).

Forms of teaching	Aspects of didactics	Tools, Services
Virtual Lecture (basic version)	S: self-study of learning material, solving exercises; ... IS: communication (tutoring); ...	text processing system, web-editors, authoring systems E-Mail
Virtual Lecture	S: self-study of course material, participation in the Internet-based exercise system, participation in discussions, ... IS: communication (tutoring); ISS: communication (exchange), ...	text processing system, web-editors, authoring systems, newsgroups; E-Mail, chat; ...
Virtual Seminar	S: self-study of course material, elaboration and presentation of a topic, team-work, ... ISS: communication (participation in discussions, exchange of contributions), ...	text processing system, web-editors, authoring systems, up-load-areas, newsgroups; E-Mail, chat; ...
...	...	...
abbreviations: S: Student, I: Instructor, IS: Instructor and Student, ISS: Instructor and Students		

Table 1: Rough classification of existing kinds of learning activities

At a university there are different kinds of teaching events like "lectures" (i.e. courses within which content is delivered analogical to traditional lectures), seminars, exercises, and practical trainings. For each of them different forms of performing them "virtually", i.e. based on Web and Internet technology, are elaborated. Table 1 exemplifies a rough classification of *Virtual Lecture* and *Virtual Seminar*, showing didactical aspects and the tools and services typically used within these course types. The example shows that different concepts of teaching forms and specifications are realized. In the basic form of a Virtual Lecture, for example, the instructor and the student communicate by E-Mail. In its version described in the next row newsgroup and chat are used in addition to support group discussions of students. Usually this communication tools are also used while running a virtual seminar, within which additional services are utilized, e.g. ftp as entrance for an up-load range for the exchange of elaborations.

In particular, instructors who are inexperienced with e-learning like to access existing knowledge. Therefore, at the university of Hagen several workshops are organized within which instructors have the chance to share their knowledge ("teach the teacher"). However, organizing as well as participating in such events is often claimed to be too time consuming. Furthermore, it does not help if an instructor needs ad-hoc information for designing his online course.

Even if an instructor knows how to design a virtual course the tasks related with its administration often cause significant problems and effort. The influence of this additional problem can be discussed in terms of *technical aspects* and *degree of support*. Many instructors have problems to handle the platform (often the effect of the "users don't read manuals" phenomenon) as well as Internet services like videoconferencing or chat-rooms. Even if the services are well known their handling appears confusing due to the different user interfaces providing access to them. Inexperienced users require a simple integration of Internet services thus "hiding" the underlying techniques. Experienced users ask for an open system allowing easy integration of additional services and tools. Furthermore, this group of instructors wants to get rid of tasks dealing with technical aspects, for example, administrating a server or setting up a chat room or newsgroup.

Tool Support: Adaptable Course Assistant

Altogether, besides assistants in developing learning materials the instructors require functionalities for administrating and managing courses. Considering experience from other universities it becomes obvious, that there exists in general a lack of a broad system support regarding different processes, which takes into account organizational as well as teaching tasks to be fulfilled while performing e-learning (e.g. Klobas & Renzi 2000, Tielmans & Coll's 1999). Thus appropriate system functionalities have to be implemented with regard to

- aspects of didactics (e.g. showing the instructors how to utilize Internet technology in online courses),
- technology to be used (e.g. free the users from pure technical aspects as far as possible), and
- organizational aspects of a course (i.e. of the university as these are part of running a course, e.g. exchanging data with the examination office).

To provide such system support we are currently developing an adaptable course assistant[3] supporting instructors in selecting and using web technology while they are planning and running their courses. The basic concepts are:

Course Templates. Based on the instructors experience each course template describes a possible way (as a small workflow) of running a type of course, e.g. a web-based seminar, lecture, or practical course. It shows how and when different technologies of the web may be utilized while running a course. Thus, the course templates are reflecting the knowledge about the appropriate technology to be selected in the context of a specific type of course.

Configurable Building Blocks. A template consists of different building blocks. Each one groups functionalities provided by the platform Virtual University or offers special web-services, e.g. functionalities for using a chat room. Most of the building blocks can be configured according to special needs of an individual course. The chat building block, for example, provides parameters for specifying the date and time within which the chat should be available. As an example, the left frame within the window in figure 1 shows a template of the essential version for content teaching courses (named *Basisschablone*, Basic Template in English). The structure of the building blocks constituting a template are visualized by means of a hierarchical tree notation.

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[3] in German: ALVA – Adaptierbarer LehrVeranstaltungsAssistent; the project is funded by the Federal Minister of Research and Technology

Adaptability. Most of the instructors have their own ideas about how to realize web-based teaching. For example, an upload-area or chat room is not used by all of them within a virtual seminar. In addition, even a single instructor changes the way of handling a given course from time to time. Hence, support is required not only for different types of courses but also for different ways of processing a special kind of course. For this purpose a course template is adaptable, which is realized by means for removing and inserting building blocks. The editor supporting adaptation is depicted in figure 2 (a), which shows a modified version of the basic template containing additional building blocks with respect to the template shown in figure 1. The working area comprises a list of building blocks which are provided by the assistant but not included in the template so far. From this list the instructor can select those building blocks he wants to include in his template.

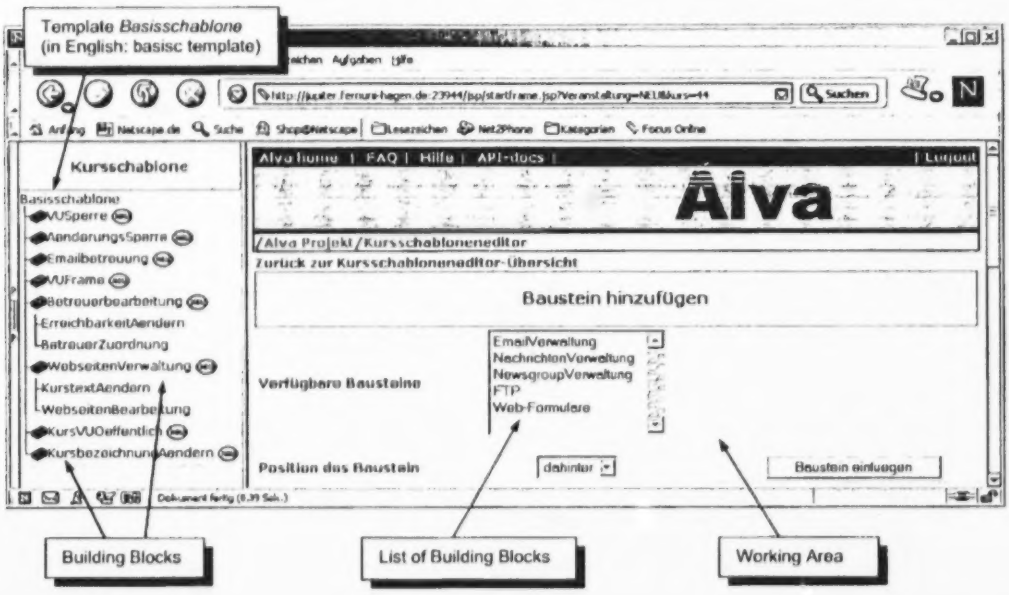

Figure 1: Editor for adapting course templates

Runtime support. The templates describe possible ways of performing courses online while their building blocks provide appropriate system functionality. This runtime system, i.e. the adaptable course assistant, provides access to the web technology as implemented by the building blocks of a template, and functions for managing the course (in some aspects similar to a workflow management system). This is implemented by generating, based on the template description, the runtime component and its user interface. Hence, for each building block the assistant provides access to the respective functionality. For example, according to the template depicted in Figure 2 (a) the assistant enables to invoke those functionalities implemented by the building blocks of the basic template Figure 2 (b) depicts parts of the generated user interface, within which the instructor gets access to the functionality, for example, of the building block "VU Sperre".

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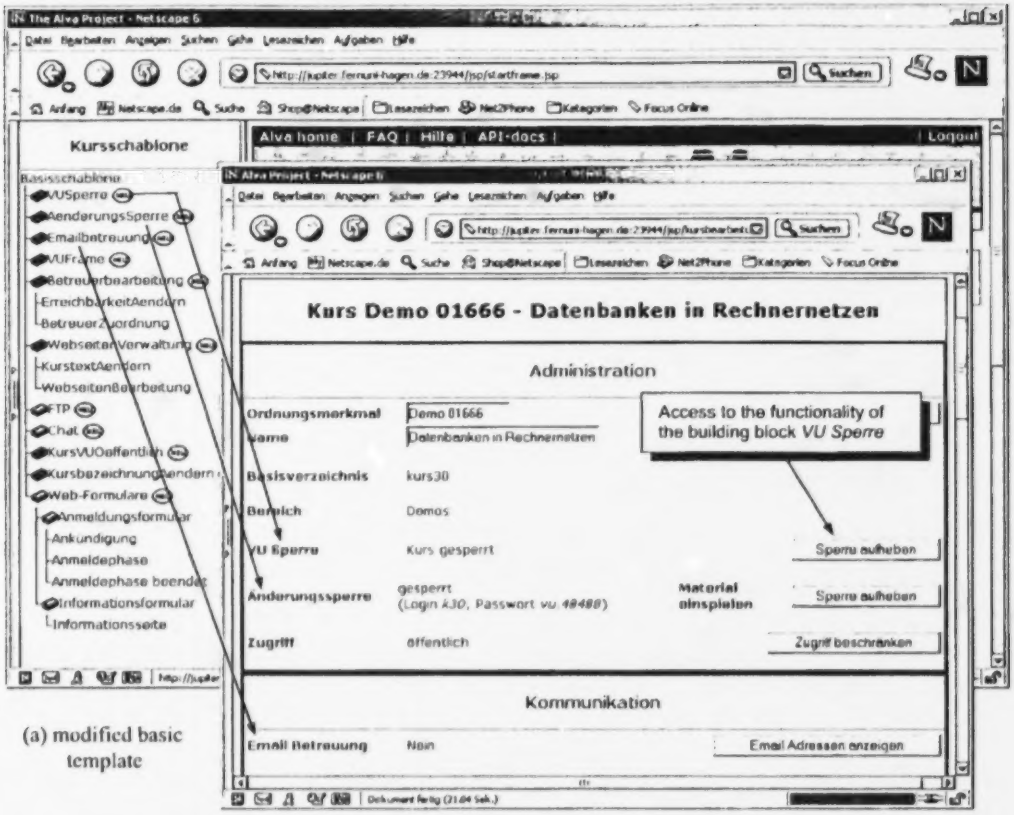

(a) modified basic template

(b) user interface of the runtime system

Figure 2: Dependency between template description and runtime support

Discussion

Starting with the development of the first prototype of the Virtual University (Buhrmann et al. 1997) the usergroup of the instructors was analyzed. As a result an increasing demand for tools supporting the tasks of the roles course designer and course administrator was identified (see also Biedebach et al. 2002, Feldmann & Schlageter 2001). In the following special components allowing dedicated support like the Seminar Assistant (Biedebach et al. 2001) and the WebAssign (Brunsmann et al. 1999) were developed. The Seminar Assistant aids instructors in conducting virtual seminars and allows easy utilization of the required internet services. Its implementation, however, is based on a very specific type of course, preventing its adaptation to other kinds of virtual seminars. The system WebAssign allows to perform online exercises and can be used within different types of courses. It represents a special "building block" and was developed separately, such that direct integration into the whole platform is not possible easily.

The approach of adaptable course templates proposed in this paper allows adaptation of planned course types to individual requirements. The system helps in selecting and utilizing Internet and web technology, respectively, to enhance distance education. For that purpose it provides different templates showing how a course of a special type, e.g. a content teaching course or a virtual seminar, may be executed. Each template can be altered to meet the special needs of a course and the individual ideas of its instructor. At runtime it provides access to the web technology as implemented by the building blocks constituting the template. Furthermore, functions are available for managing the course (like a small workflow management system).

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A similar approach is provided by TeleTOP (de Boer & Collis 1999), within which web-based course-support environments are generated. Similar to our assistant all courses have a common interface design, but differ in their chosen functionalities. In contrast to TeleTOP our assistant provides not only pure building blocks but also diverse templates depicting established ways of running different kinds of web-based courses.

Workflow management system technology is also investigated in other approaches aiming at tool support for instructors. There it is employed to coordinate e-learning activities within a single course, in particular in conjunction with groupware tools to manage collaborative learning (e.g. Medélez et al. 1999). However, in these environments the underlying model is fixed and thus not adaptable to different course structures and types.

The described software assistant will be a part of the platform of our university, thus integrating this approach into a general environment which also supports organizational aspects (business processes). Our current work is aiming at the implementation of an assistant supporting students of the university. Its runtime system will also be based on the course templates specified by the instructors.

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Acknowledgements

This work was funded by the Federal Ministry of Education and Research. The authors would like to thank the group members of the ALVA project for implementing the prototype of the adaptable course assistant.

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